

FIG. 1

060606-074960

```

1   $N_{min} \leftarrow 2$ 
2  if  $size[X] < N_{min}$  or  $size[Y] < N_{min}$ 
3    then return (0,0)
4  for each key  $k \in X$ 
5    do  $D_x[X[k]] \leftarrow D_x[X[k]] + 1$ 
6   $MaxEntropy \leftarrow size[X] * \log(size[D_x])$ 
7  for each key  $k \in Y$ 
8    do  $D_y[Y[k]] \leftarrow D_y[Y[k]] + 1$ 
9   $Entropy \leftarrow 0$ 
10 for each key  $k$  of  $D_y$ 
11   do  $Entropy \leftarrow Entropy - D_y[k] * \log(D_y[k]/size[Y])$ 
12 return( $MaxEntropy, Entropy$ )

```

FIG. 2

```

1   $N_{min} \leftarrow 4$ 
2  if  $size[X] < N_{min}$ 
3      then return  $(0,0)$ 
4   $n_x \leftarrow \lceil \sqrt{size[X]} \rceil$ 
5   $X_{sort} \leftarrow sort[X]$ 
6  for  $j \leftarrow 1$  to  $n_x$ 
7      do  $Bounds[j-1] \leftarrow X_{sort}[n_x * j - 1]$ 
8   $MaxEntropy \leftarrow n_x * \log(\sqrt{size[X]})$ 
9   $MaxBounds \leftarrow Bounds[n_x - 1]$ 
10 for each key  $v \in Y$ 
11     do for each key  $k$  of  $Bounds$ 
12         do if  $Y[v] < Bounds[k]$ 
13             then  $D_Y[k] \leftarrow D_Y[k] + 1$ ; next
14             if  $Y[v] > MaxBounds$ 
15                 then  $D_Y[n_x - 1] \leftarrow D_Y[n_x - 1] + 1$ 
16             next
17 for each key  $k$  of  $D_y$ 
18     do  $Entropy \leftarrow Entropy - D_y[k] * \log(D_y[k]/size[Y])$ 
19 return  $(MaxEntropy, Entropy)$ 

```

FIG. 3

$\Omega_{\text{cxc}}(X, Y)$

- 1 $N_{\min} \leftarrow 16$
- 2 **if** $\text{size}[X] < N_{\min}$
- 3 **then return** $(0,0)$
- 4 $n_x \leftarrow \lceil \sqrt[4]{\text{size}[X]} \rceil$
- 5 $X0_{\text{sort}} \leftarrow \text{sort } X \text{ by 0 dimension}$
- 6 $\text{Bounds0} \leftarrow \text{FINDBOUNDARIES}(X0_{\text{sort}}, \text{dimension } 0)$
- 7 $X1 \leftarrow \text{COLLECTDATA}(\text{Bounds0}, X0_{\text{sort}})$
- 8 $X1_{\text{sort}} \leftarrow \text{sort}[X1]$
- 9 $\text{Bounds1} \leftarrow \text{FINDBOUNDARIES}(X1_{\text{sort}}, \text{dimension } 1)$
- 10 $D_y \leftarrow \text{BINPACK}(Y, \text{Bounds0}, \text{Bounds1})$
- 11 $\text{MaxEntropy} \leftarrow n_x * \log(\sqrt{\text{size}[X]})$
- 12 **for** $i \leftarrow 0$ to n_x
- 13 **do for** $j \leftarrow 0$ to n_x
- 14 **do** $\text{Entropy} \leftarrow \text{Entropy} - D_y[i][j] * \log(D_y[i][j] / \text{size}[Y])$
- 15 **return** $(\text{MaxEntropy}, \text{Entropy})$

FIG. 4

```

 $\Omega_{\text{cxd}}(X, Y)$ 
1   $N_{\min} \leftarrow 2$ 
2  if  $\text{size}[X] < N_{\min}$  or  $\text{size}[Y] < N_{\min}$ 
3      then return (0,0)
4   $n_x \leftarrow \text{size}[X]$ 
5   $X0_{\text{sort}} \leftarrow \text{sort } X \text{ by 0 dimension}$ 
6  for each key  $k$  of  $X0_{\text{sort}}$ 
7      do  $XD[X0_{\text{sort}}[k][1]] \leftarrow XD[X0_{\text{sort}}[k][1]] + 1$ 
8   $n_m \leftarrow \text{size}[XD]$ 
9   $\alpha \leftarrow \log(n_m)/\log(n_x)$ 
10  $n_c \leftarrow n_x^\alpha$ 
11 if  $n_c < N_{\min}$  or  $n_m < N_{\min}$ 
12     then return(0,0)
13  $\text{Bounds0} \leftarrow \text{FINDBOUNDARIES}(X0_{\text{sort}}, \text{dimension } 0)$ 
14  $\text{MaxEntropy} \leftarrow n_x * \log(n_x^\alpha * n_m)$ 
15  $D_y \leftarrow \text{BINPACK}(Y, \text{Bounds0})$ 
16 for  $i \leftarrow 0$  to  $n_x$ 
17     do for each key  $j$  of  $D_y[i]$ 
18         do  $\text{Entropy} \leftarrow \text{Entropy} - D_y[i][j] * \log(D_y[i][j]/\text{size}[Y])$ 
19 return( $\text{MaxEntropy}, \text{Entropy}$ )

```

FIG. 5

```

 $\Omega_{d \times d}(X, Y)$ 
1   $N_{min} \leftarrow 4$ 
2  if  $size[X] < N_{min}$  or  $size[Y] < N_{min}$ 
3    then return (0,0)
4  for each key  $k \in X$ 
5    do  $D_{x1}[X[k][0]] \leftarrow D_{x1}[X[k][0]] + 1$ 
6        $D_{x2}[X[k][1]] \leftarrow D_{x2}[X[k][1]] + 1$ 
7   $n_m \leftarrow size[D_{x1}] * size[D_{x2}]$ 
8   $MaxEntropy \leftarrow size[X] * \log(n_m)$ 
9  for each key  $k \in Y$ 
10   do  $D_y["Y[k][0]Y[k][1]"] \leftarrow D_y["Y[k][0]Y[k][1]"] + 1$ 
11  $Entropy \leftarrow 0$ 
12 for each key  $k$  of  $D_y$ 
13   do  $Entropy \leftarrow Entropy - D_y[k] * \log(D_y[k]/size[Y])$ 
14 return( $MaxEntropy, Entropy$ )

```

FIG. 6

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Change	Semaphore	Odds favoring problem	Potential of problem (Maximum credible assessment)
Normal		3 to 1	Little potential of problem
Outer Normal		6 to 1	Substantial potential of problem
Borderline		20 to 1	Strong potential of problem
Abnormal		>20 to 1	Decisive potential of problem

FIG. 7



FIG. 8

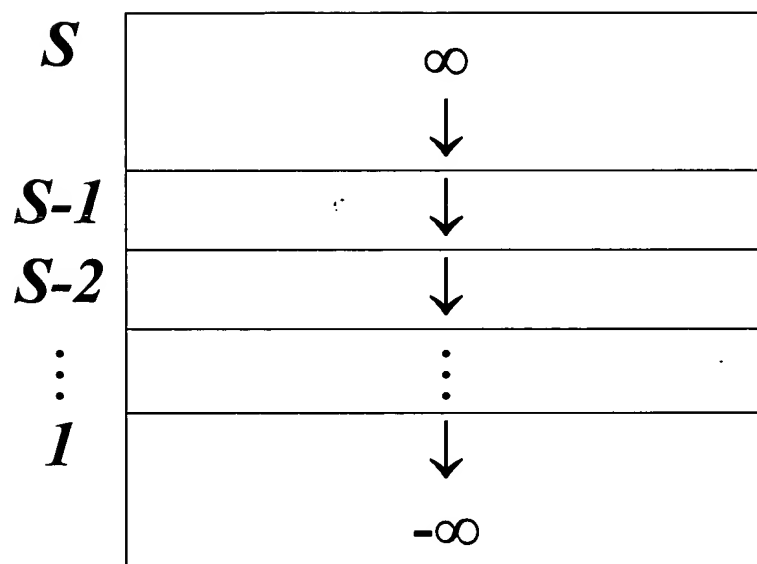


FIG. 9

100810

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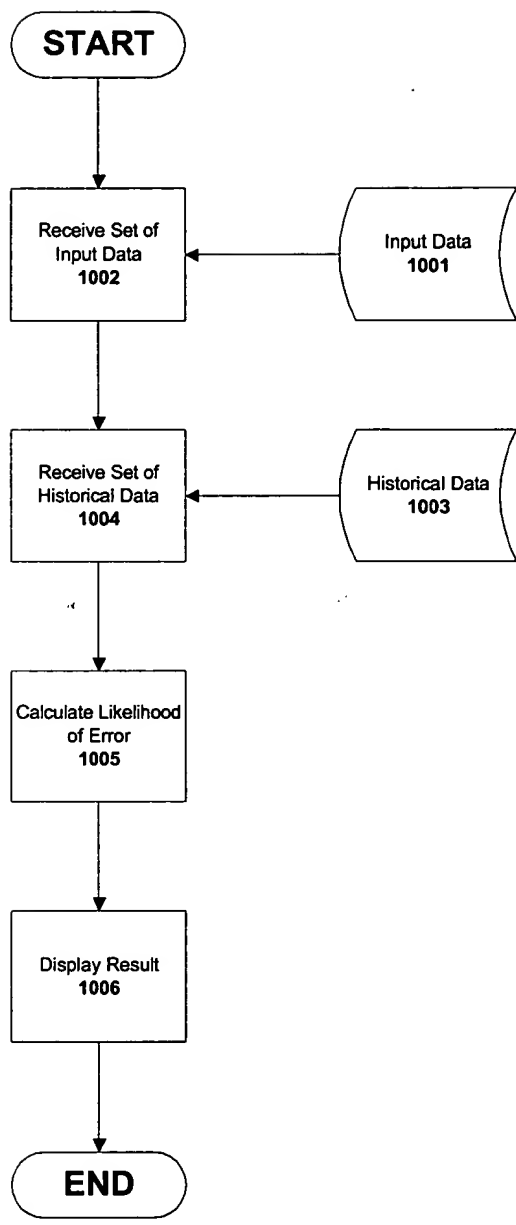


FIG. 10